

# Offshore Wind Strategy Rollout: FAQs

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## Questions

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### **1. Why is DOE interested in offshore wind energy?**

The responsible development of offshore wind energy can help the nation meet its interconnected energy, environmental, and economic challenges. Offshore wind energy can help the nation reduce its greenhouse gas emissions, diversify its energy supply, provide cost-competitive electricity to key coastal regions, and stimulate economic revitalization of key sectors of the economy. 80% of Americans live in coastal states or states bordering the Great Lakes. However, key barriers to deployment must be overcome in order for offshore wind to achieve those benefits for the nation, and DOE will work with federal agencies and external stakeholders to address those barriers.

### **2. How much energy could be provided by offshore wind in the U.S.?**

According to analysis from the National Renewable Energy Laboratory (NREL), the total gross offshore wind resource for the United States (in areas with average wind speeds greater than 7.0 meters per second, and up to 50 nautical miles from shore) is 4,150 gigawatts (GW), equivalent to four times today's national electrical generating capacity and twice as much as today's electricity generation. A separate report from DOE, *20% Wind Energy by 2030*,<sup>1</sup> studied the feasibility of a scenario in which wind energy contributed 20% of the nation's electricity by the year 2030. This analysis found that offshore wind could feasibly provide 54 GW of generating capacity by 2030.

### **3. What is the purpose of DOE's Offshore Wind Strategic Work Plan?**

DOE prepared the draft Offshore Wind Strategic Work Plan to outline the actions it will undertake, subject to appropriations, to support the responsible development of an offshore wind energy industry in the U.S. Over the next months, DOE will continue to refine this draft Work Plan to reflect input from federal agencies, other stakeholders, and the public. This input will help DOE target its research and development investments to achieve the greatest impact and leverage with existing federal and stakeholder equities in the field of marine energy.

### **4. What is the Offshore Wind Innovation and Demonstration (OSWInD) Initiative?**

The Department of Energy's Offshore Wind Innovation and Demonstration (OSWInD) Initiative is a set of planned activities, subject to appropriations, that will promote and accelerate responsible commercial offshore wind development in the U.S. The Initiative will address two critical objectives: lowering the cost of energy produced by offshore wind turbines, and reducing the timeline for deploying wind turbines. The Initiative plans to undertake a national research and development effort to advance offshore wind turbine technology; to collaborate with key stakeholders to reduce the market barriers preventing the deployment of offshore wind power; and to partner with world-class consortia in deploying the first offshore wind power projects in U.S. waters.

### **5. What activities will the OSWInD Initiative undertake?**

Through the OSWInD Initiative, DOE will: support the development of innovative technology capable of lowering the cost of energy produced by offshore wind turbines by lowering capital costs, increasing reliability, decreasing operating and maintenance costs, and increasing energy capture; provide

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<sup>1</sup> [http://windandhydro.energy.gov/wind\\_2030.html](http://windandhydro.energy.gov/wind_2030.html)

technical input to regulators to support effective permitting and regulatory decision-making; undertake applied research on key project siting issues, such as wind turbine-radar interaction, effects on wildlife, and competing-use impacts; promote the development of infrastructure necessary to support offshore wind energy, such as portside staging and fabrication facilities, specialized turbine installation vessels, and wind equipment supply chain capacity; and partner with developers of the first U.S. offshore wind projects to broaden the knowledge base and accelerate future deployment. These efforts will be conducted through a suite of activities, subject to appropriations: innovative turbines; marine systems engineering; computational tools and test data; resource planning; siting and permitting; complementary infrastructure; and advanced technology demonstration projects.

## **6. How will DOE coordinate with other federal and state agencies to accelerate offshore wind deployment?**

DOE is committed to working with the Department of the Interior's Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) and other regulatory agencies to improve confidence in the offshore wind permitting regime. Regulatory agencies are statutorily required to answer certain procedural milestones as part of the offshore wind project permitting process. DOE will work directly with these agencies to identify potential efficiencies to be gained in meeting those milestones. This work will take place through existing interagency efforts, such as DOE's Memorandum of Understanding (MOU) with the Department of the Interior (DOI) and DOI's activities with the Atlantic Offshore Wind Energy Consortium (AOWEC), a group of state governors that work to promote the responsible development of wind resources on the Outer Continental Shelf. Regulatory agencies also have to answer substantive questions about the impacts that offshore wind projects are likely to have on the environment and on other users of the ocean space. DOE will undertake targeted research and development on those potential impacts to help these agencies accelerate the permitting process and reduce the information burden on individual project developers. Finally, DOE's partnerships in advanced technology demonstration projects (subject to appropriations) will help accelerate future project deployments by building experience among developers and regulators.

## **7. How will DOE bring down the cost of offshore wind energy?**

DOE plans to assist industry in reducing the cost of energy from offshore wind turbines by (1) increasing system performance efficiency and decreasing capital costs through the development of larger, innovative components and integrated systems; (2) decreasing the costs of operating and maintaining offshore wind turbines by improving system reliability and reducing the need for equipment replacement; and (3) decreasing project financing costs by reducing project risks and improving confidence (among financiers, regulators, and the public) in offshore wind energy technology.

## **8. How will DOE undertake advanced technology demonstration projects?**

DOE's advanced technology demonstration projects will consist of partnerships with broad consortia that are developing breakthrough offshore wind energy generation projects. DOE, subject to appropriations, will partner with one or more commercial offshore wind power developers, research consortia, power producers and/or utilities to develop these projects. These cost-shared partnerships will be chosen through competitive solicitations and will consider geographical and technological diversity, technical merits, progress to date toward project deployment, ability of DOE participation to

accelerate project deployment, and the project's potential contribution towards broadening the industry knowledge base.

#### **9. What is DOE already doing with regard to offshore wind?**

DOE is investing roughly \$78 million in Recovery Act funds to support the development of innovative, next-generation offshore wind technology. These investments include \$45 million for a Large Wind Turbine Drivetrain Test Facility capable of testing drivetrains of up to 15 MW in power; \$25 million for a Large Blade Test Facility capable of testing turbine blades up to 90 meters in length; and \$8 million to develop floating platforms for deepwater offshore wind turbines. In addition, the program funds offshore wind energy feasibility assessments, technical analysis, environmental studies, and technology research and development by universities and national laboratories.

#### **10. Will DOE engage in coastal and marine spatial planning?**

DOE was involved in the Interagency Ocean Policy Taskforce, whose recommendations, including national guidelines for coastal and marine spatial planning, were adopted by President Obama in June 2010 as the National Ocean Policy. DOE will continue to engage with the National Ocean Council as they implement the National Ocean Policy to ensure that the responsible deployment of ocean renewable energy remains a priority during that process and that coastal and marine spatial planning does not unduly delay or disrupt ocean renewable energy deployment or restrict access of ocean renewable energy development in high-priority areas.

#### **11. What is the cost of energy generated by offshore wind turbines?**

Currently, the projected cost of energy from offshore wind turbines depends on local conditions, but is relatively high (greater than \$0.25 per kilowatt-hour) due to increased turbine and foundation capital costs (reflecting turbine upgrades required for operation at sea, marine foundations, balance-of-plant infrastructure such as substations and undersea cabling, interconnection to the electrical grid, and specialized turbine installation vessels). The cost of offshore wind energy is also impacted by higher operations, maintenance, and equipment replacement costs caused by the harsh marine environment and the remoteness and relative inaccessibility of offshore turbines. The offshore wind energy cost estimates in the draft Strategic Work Plan were developed by the National Renewable Energy Laboratory (NREL) and are based on data from European projects and projections for the U.S. market. For more details, please see page 17 ("Long-Term Scenarios for Reducing Cost of Energy") of the draft Work Plan.

#### **12. Can offshore wind power be competitive without subsidies?**

Some of the best U.S. offshore wind resources are located off the North Atlantic coastal states with some of the nation's highest electricity prices and aggressive renewable portfolio standards, leading these states to view offshore wind more favorably from a cost-competitive perspective. Additionally, the proximity of offshore wind resources to large population centers reduces the need for long-distance transmission lines, further reducing costs versus other renewable generation sources. Finally, some coastal and Great Lakes states lack utility-scale renewable energy resources other than offshore wind, making it an attractive option for in-state renewable energy production. Over time, DOE believes that offshore wind energy will gradually become cost-competitive with land-based wind and other sources.

Although offshore wind power is currently more expensive than land-based wind, offshore wind technology is at an early stage of development, and opportunities exist for substantial cost reductions through deployment risk reduction, production volume, and technology refinement. DOE plans to undertake an aggressive research and development program, subject to appropriations, to drive down the cost of offshore wind energy through technological innovation in areas such as foundations and platforms, marinization, turbine installation methods and infrastructure, and improved reliability and maintainability.

### **13. How long does it take to permit an offshore wind project?**

The current permitting regime governing the deployment of offshore wind turbines on the US Outer Continental Shelf (OCS) is untested – the Department of the Interior’s Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) initiated the current permitting process in June 2009 (Cape Wind initially sought project approval through the Army Corps of Engineers, before BOEMRE was assigned jurisdiction over offshore wind energy on the OCS). No projects have gone through the BOEMRE permitting process, so the timeline for approvals is simply not known.

### **14. What infrastructure is needed to support offshore wind development?**

Offshore wind turbines pose new challenges for installation and maintenance in the offshore environment. Revitalized port facilities and coastal manufacturing centers will be critical in mitigating transportation challenges posed by large turbine and foundation components. DOE and other federal agencies recognize these as high priority needs. For example, the U.S. Department of Transportation’s Transportation Investment Generating Economic Recovery (TIGER) grant program will invest \$36 million to upgrade the capability of port facilities in Rhode Island and Maine to support the logistics of offshore wind turbine deployment.<sup>2</sup>

### **15. What are the environmental impacts of offshore wind on the environment?**

Offshore wind turbines have the potential to impact the oceanic environment; for example, turbine deployment could disrupt bird or marine mammal migratory routes; cause changes in seabed habitats through foundations or moorings; or displace or harm animals through construction noise and electromagnetic fields produced by subsea power cables. However, hundreds of European studies analyzed by DOE and others indicate that offshore wind has posed no significant risks to European birds, fish, marine mammals, other marine wildlife, or seas and coasts. DOE works with other agencies, such as the Department of the Interior (the lead agency responsible for permitting offshore energy facilities in U.S. waters), to identify priority research areas relating to environmental and social impacts of offshore wind turbines. These areas of research include acoustic impacts on marine mammals, impacts on fish and seabed ecosystems, electromagnetic fields, obstacles for vehicles, fishing, and aesthetics. These long-range research efforts will improve our understanding of the possible environmental effects of offshore wind power and develop mitigation strategies to avoid or minimize these effects.

### **16. Are offshore wind turbines difficult and expensive to maintain?**

Offshore wind turbines must be more rugged and reliable than turbines installed on land because of the often harsh marine environment. In addition, the ‘weather window’ during which wind plant operations

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<sup>2</sup> <http://www.dot.gov/documents/finaltigergrantinfo.pdf>, see pages 13-14.

and maintenance activities can take place can be highly variable depending on location, time of year and seasonal events. Availability and site access of helicopters, personnel boats and larger crane vessels can be far more limited than for the equipment needed to carry out similar operations on land.

To address some of the new technical challenges posed by offshore wind, DOE targets research assistance at improving reliability and reducing costs for maintenance of these systems. For example, DOE funds work by the University of Delaware on wind turbine corrosion protection, as well as innovative strategies for connecting offshore turbines to the electric grid. This type of research, paired with knowledge from the European offshore wind industry and with ongoing efforts to improve the reliability of land-based wind turbines, will help bring down the overall cost of energy from offshore wind systems.

### **17. Do offshore wind turbines interfere with radar systems?**

Wind turbines can impact many older radar systems by reflecting or deflecting radar energy. Similar problems that have been identified with land-based turbines will likely apply to offshore turbines as well. The offshore environment will pose additional challenges, and DOE is working to identify and address these siting challenges. DOE is also actively working with other federal agencies, such as the Department of Defense, Department of Homeland Security, National Oceanic and Atmospheric Administration, and Federal Aviation Administration, to develop technologies and strategies that mitigate or reduce wind-radar interference. Potential radar interference solutions include upgrading or replacing existing radar systems, both hardware and software; wind turbine technology options, such as stealth coatings on wind turbine blades; and in-fill radar systems that may be placed in or around wind farms to fill in for radar coverage that may be lost due to wind farm clutter. DOE also works with these agencies to develop radar interference mitigation strategies and to develop improvements to the project permitting process

### **18. How do offshore winds differ from land-based winds?**

Winds offshore are generally higher speeds and more stable than winds on land, since they are unobstructed by mountains, buildings and other terrain structures. Offshore winds are also strongest during the times of day when electricity demand is highest, making offshore wind a particularly useful source of energy. However, offshore wind speeds are subject to more extreme weather events such as hurricanes and gale force winds which have the potential to damage wind farms. Although winds are typically more predictable offshore, little data currently exists to validate these wind speeds.

### **19. How are the States involved in offshore wind energy?**

The creation of the Virginia Coastal Energy Research Consortium (VCERC) by the Virginia General Assembly is an example of the proactive steps taken by state and local governments to advance offshore wind energy development in their regions to complement Federal efforts. VCERC has conducted groundbreaking studies of the economic feasibility of offshore wind, identified areas suitable for offshore development, and studied workforce development potential in the Newport News area. The Great Lakes Wind Collaborative is also actively engaged in the development of the offshore wind industry. The Atlantic Offshore Wind Energy Consortium is a collection of 10 Atlantic states' governors

who have signed a Memorandum of Understanding with the Department of the Interior to promote the efficient, orderly, and responsible development of wind resources on the Outer Continental Shelf.

## **20. Will technologies other than those mentioned in the Strategic Work Plan be considered to reduce the cost of offshore wind energy?**

Technologies listed in the draft Strategic Work Plan are examples of possible pathways to improve the cost of offshore wind energy through improved efficiency, reliability and/or energy capture. There is no prescriptive intent to limit the potential technology pathways leading to substantively improved offshore wind technology. Innovation is a key element in the technology development program. Since Fiscal Year 2011 funds for offshore wind have not yet been appropriated, discussion of any future solicitations for research and development projects is premature. However, future solicitations are likely to include specific performance metrics that are aligned with programmatic goals to substantially improve the cost of energy from offshore wind turbines.

## **21. Will DOE require applications to form partnerships or collaboratives when responding to future technology solicitations?**

Partnerships and/or teaming arrangements in response to possible future solicitations, which are subject to appropriations, will be solely at the discretion of the respondents. Teaming can often enhance the depth and breadth of experience required and/or capacity to perform depending upon the specific solicitation scope and criteria. Teaming decisions need to be based on developing what the respondents believe is the most competitive response.

## **22. Will cost sharing be required in future technology solicitations?**

A range of research, development, and demonstration activities are envisioned under the OSWIND technology development program, subject to congressional appropriations. Cost-sharing requirements will be determined by specific DOE guidelines and reflect the maturation index of technology development and commercialization level. For example, activities producing public domain paper studies and/or analytic models may require minimal and/or no cost share whereas commercial prototype development require substantial contribution. Cost share requirements on any future research and development solicitations will be determined based on a number of factors and in accordance with DOE guidelines and requirements.